



# LESSON PLAN

## LIGHT AND REFLECTION GRADES 3-5

### SUMMARY

To explore the science behind light and reflections. Students investigate properties of light and its importance to human vision. They also use light and reflection to create a cool visual phenomena.



**4-PS4-2** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

Science & Engineering Practices	Connections to Classroom Activity
Developing and Using Models (4-PS4-2)	<ul style="list-style-type: none"> <li>Observe and draw models of the human eye.</li> </ul>
Disciplinary Core Ideas	Connections to Classroom Activity
<p><b>PS4.B: Electromagnetic Radiation</b> An object can be seen when light reflected from its surface enters the eyes.</p> <p><u>Additional DCIs addressed by this lesson:</u> <b>LS1.A: Structure and Function</b> Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.</p>	<ul style="list-style-type: none"> <li>Experiment with trying to see objects when there is no light to learn how it is necessary.</li> <li>Think about the human eye and brain and how these structures help us see and process information.</li> <li>Explore the human sense of sight.</li> </ul>



### LS1.D: Information Processing

Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

#### Crosscutting Concepts

Cause and Effect (4-PS4-2)

#### Connections to Classroom Activity

- Explore the cause and effect relationship between light and vision.

## DURATION

One to two 45 minute classroom periods

## PRE-ASSESSMENT QUESTIONS

Please see discussion questions located under the video. These can be discussed as a group or answered individually in student science notebooks.



## ENGAGE

Pass out mirrors, and have students look in a mirror. What do they see? Themselves. Why? Their sense of vision (eyes and brain) are working with light to be able to see the image of themselves. The shiny smooth surface of the mirror reflects light and we see an image in the reflection.



## EXPLORE

Is light truly necessary for our eyes to be able to see objects? Students can answer this question by taking various objects into a space completely devoid of light. First, working together, the students and teacher must identify a space that can be made completely dark. A coat or broom closet might be a good choice. The class should work together to eliminate any light that may enter a space like this—e.g. from under or around the door. Once complete darkness is established, place an object of the teacher's choosing inside the dark room without the students seeing what it is. A teacher or another helper can take turns blindfolding students (individually or as many will fit in the space) and escorting them into the room. When the room is completely dark, the helper can remove the blindfold and students can open their eyes. Without touching the

## MATERIALS

- Coat or broom closet with no windows, or similar dark space
- Various medium sized objects that will remain unseen by students until later in the activity, such as bucket, a soccer ball, or a keyboard
- Blindfold
- Inexpensive laser pointer
- Several mirrors

### DIY Activity

- Video—create your own or download from [www.generationgenius.com](http://www.generationgenius.com)
- Phone or tablet (if using video)
- Box or dollhouse (should be large enough for the sheet of clear plastic to fit inside diagonally)
- Sheet of clear plastic
- Tape

object, they should try to see what it is. The blindfold can then be replaced and the student escorted back out of the room. Students should write down what they saw, if they were able to see anything at all. When everyone has had a chance in the room, reveal the object. Were students correct? Do their eyes work in total darkness?



## EXPLAIN



AS A GROUP, WATCH THE GENERATION GENIUS VIDEO: LIGHT AND REFLECTION.

Then, facilitate a conversation using the Discussion Questions.



## ELABORATE

Students can complete the DIY Activity, which takes what they have learned about eyesight and reflection, and applies it to a fun project. Students should be able to explain how light and reflections cause the Pepper's Ghost phenomena to work.



## EVALUATE

In their science notebooks, students should draw a diagram that shows how our eyes see our reflections in the mirror. Light reflected off the image enters the eyeball through the front lens. Since light travels in straight lines, it crosses at the lens, inverting the image at the back of our eye. Our brain automatically turns the image right side up!

